



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application of:

SUBRAMANIAM, BALA et al.

Serial No.: 09/940,015

Filed: August 27, 2001

PRESSURE-TUNED SOLID CATALYZED  
HETEROGENEOUS CHEMICAL REACTIONS

Docket No.: 31888

Group Art Unit No.: 1764

Examiner: Dang, Thuan D.

TRANSMITTAL

Transmitted herewith are: Express Mail Transmittal (1 page); RCE Transmittal (1 page); Petition for Extension of Time (1 page); Preliminary Amendment and Response (13 pages); Declaration of Bala Subramaniam (3 pages) Check for \$595.00; and return postcard.

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Respectfully submitted,

HOVEY WILLIAMS LLP

Dated: May 11, 2004

by

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REACTIONS

Assistant Commissioner of Patents  
Washington, D.C. 20231

Sir:

I, Bala Subramaniam, declare and state as follows:

1. I am one of the inventors of the above-referenced patent application.
2. I have reviewed the Office Action dated December 11, 2003 as well as the currently pending claims of the above-referenced application.
3. Claim 1 of the present application requires that the reactor feed be "under near-or supercritical reaction conditions relative to said reactant mixture."

4. The Office Action interpreted that claim 1 of the present application was obvious in view of U.S. Patent No. 5,907,075 to Subramaniam et al., because "at the first time when the reactants are fed to the reactor, the reaction mixture is the reactant mixture since at that time, the product is not produced yet (Office Action page 3).

5. I was also one of the inventors of the '075 patent.

6. The interpretation of numbered paragraph 4 is not true. Temperatures that are near-critical or supercritical relative to the reaction mixture are different from temperatures that are near-critical or supercritical relative to the reactant mixture. This is because the reaction mixture also includes the reaction products (i.e. the C8 alkylation products among others). If the conditions are supercritical relative to the reaction mixture, such conditions keep all species in a single homogenous phase thereby preventing the desired separation of the heavier products, (which preferentially collect in the macropores using the methods of the present invention) from the C8 alkylation products. In contrast, if the process keeps temperatures in the supercritical range relative to the reactant mixture, the desired separation of the C8 alkylation products occurs and the heavier products collect in the macropores of the catalyst.

7. Accordingly, one of skill in the art, upon reading the present specification, would consider the reactant mixture and the reaction mixture as two distinct fluids and would not consider the reaction mixture to be the reactant mixture as it was fed into the reactor. Thus, temperatures near-critical or supercritical to the reactant mixture would be different from temperatures near or supercritical relative to the reaction mixture. Temperatures that are supercritical to the reaction mixture are those above the critical temperature of the reaction mixture with a specific composition. As a result of these differences, the present invention achieves the goal of separating the C8 alkylation products in the reaction mixture.

8. Claim 16 requires as a part of the regenerating step "elevating the pressure within said reactor and/or lowering the reactor temperature to effect at least partial removal of coke from said catalyst." This claim was rejected on the basis that it would have been obvious to elevate the pressure in order to optimize the reaction. No reference is cited for this proposition.

9. The effect of lowering the reactor temperature or increasing the pressure within the reactor is that the density of the reaction mixture increases, which thereby, as found by the inventors, permits the desired extraction of the retained heavy products from the pores following a reaction cycle. Accordingly, one of skill in the art would look toward methods of increasing the density of the reaction mixture. There are no teachings in the art to increase this density, in fact, the cited reference (U.S. Patent No. 5,491,278) suggests to do the opposite, that is to decrease the pressure or increase the temperature. Such is the disclosure in column 5, line 27 to column 6, line 19 which describes the reaction and catalyst regeneration. The other cited reference is the '075 patent which is silent as to any of these steps.

10. Accordingly, one of skill in the art, upon reading the cited references would not have been motivated to increase the pressure or decrease the temperature.

because the references teach exactly the opposite steps. Moreover, one of skill in the art would also not have been motivated to increase the density of the reaction mixture, which is the result of lowering the temperature or increasing the pressure.

11. I further declare that all statements made herein of my own knowledge are true and all statements made on information and belief are believed to be true, and further that these statements were made with the knowledge that willful, false statements and the like are punishable by fine or imprisonment, or both, under § 1001 of Title 18 of the United States Code, and such wilful false statements may jeopardize the validity of any patents issued from the patent application.

Bala Subramanian

BALA SUBRAMANIAM

Date: 05/07/04